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**REMARKS**

Claims 1 and 3-8 are currently pending in the subject application, and are presently under consideration. Claims 1, 3, 5, 6, and 8 have been amended herein. New claims 22-27 have been added to emphasize various novel aspects of the invention consistent with the claims 1 and 3-8, currently under consideration. Accordingly, entry and consideration of these claims is respectfully requested since they do not raise new issues requiring undue consideration or effort.

Favorable reconsideration of the claims is respectfully requested in view of the comments below.

**I. Rejection of Claims 1 and 3-8 Under 35 U.S.C. §112, first paragraph**

Claims 1 and 3-8 are rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. In particular, the Examiner contends that the written requirement has not been met because the element reciting a pressure drop across the inlet valve as being "at least 10 bar" is an open-ended range which allegedly indicates an infinite pressure drop is possible and which is supposedly not disclosed in the originally filed disclosure. For at least the following reasons, Applicants request withdrawal of the rejection. Claim 1, from which claims 3-8 depend, has been amended as indicated in the previous section entitled "Amendments to the Claims" (pp. 2-5) to resolve the Examiner's rejection. In particular, the pressure drop being "at least 10 bar" depends on independent adjustments made to the inlet valve and outlet valve has been. Hence, one of ordinary skill in the art would recognize that the amount of pressure drop across the inlet valve depends on the independent adjustments made to the inlet and outlet values. Thus, the rejection should be withdrawn.

**II. Rejection of Claims 1 and 3-8 Under 35 U.S.C. §112, second paragraph**

Claims 1 and 3-8 are rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner seems to question "what particular valve or system configuration, if any, is required in order to meet the at least 10 bar pressure drop across the inlet valve. Again, as previously stated, claim 1 has been amended

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to recite that the inlet valve is controlled by the controller in such a way as to facilitate obtaining an optimal pressure drop across the inlet valve. Thus, the metes and bounds of protection sought by claim 1 and all claims depending therefrom are clear and definite. In view of the foregoing, the rejection should be withdrawn.

### **III. Rejection of Claims 1, 3, 4, 7, and 8 Under 35 U.S.C. §102(e)**

Claims 1, 3, 4, 7, and 8 stand rejected under 35 U.S.C. §102(e) as being anticipated by Nishizawa *et al.* (U.S. Patent No. 6,464,793). Applicants respectfully request withdrawal of this rejection for at least the following reasons.

For a prior art reference to anticipate, 35 U.S.C. §102 requires that "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999) (*quoting Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

Claim 1, from which claims 3, 4, 7, and 8 depend, has been amended herein as previously mentioned. As written, claim 1 relates to a cooling system that includes a chamber for receiving at least one coated semiconductor substrate; *a high pressure fluid reservoir that vents cooling fluid into the chamber*; a coupling coupled to the chamber and the high pressure fluid reservoir for placing the chamber in fluid communication with the high pressure fluid reservoir, *the coupling comprising a filter to exclude contaminate particles from the fluid*; an inlet valve attached to the coupling for controlling a flow of cooling fluid between the high pressure fluid reservoir and the chamber, wherein the pressure drop across the inlet valve affects the cooling fluid temperature and is at least about 10 bar depending on independent adjustments made to the inlet valve and outlet valve; a controller coupled to the inlet valve that *controls the inlet valve* to optimize the pressure drop across the inlet valve *separately and apart from the outlet valve by making adjustments to each independently of the other* based on calculated temperature readings of the respective valves.

Nishizawa *et al.* does not disclose each and every element set forth above in claim 1. Rather, Nishizawa *et al.* is directed to a semiconductor crystal growth apparatus suited for forming monocrystalline growth layers. Nozzles 4 and 5 are employed in Nishizawa *et al.* for introducing gaseous compounds containing III and V group elements. Nozzles 4 and 5

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are provided with on-off valves 6 and 7 for controlling the introduced amounts of gaseous compounds.

The Examiner relies on the on-off valves 6 and 7 of Nishizawa *et al.* as being equivalent to the claimed inlet valve. However, Nishizawa *et al.* does not disclose inclusion of a high pressure reservoir that provides a cooling fluid to the chamber, a coupling comprising a filter and/or a controller for separately controlling inlet and outlet valves by adjusting the valves independently of the other. By adjusting the temperature of the incoming cooling fluid as well as by regulating the outgoing flow of cooling fluid from within the chamber, a pressure drop can also be increased to effect more uniform cooling of the substrate. Nishizawa *et al.* neither discloses nor teaches such elements.

Therefore, Nishizawa *et al.* does not anticipate claim 1 and the claims that depend therefrom. Thus, the rejection should be withdrawn.

#### IV. Rejection of Claims 1 and 3-6 Under 35 U.S.C. §102(b)

Claims 1 and 3-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by Kazama *et al.* (U.S. Patent No. 5,567,267). For at least the following reasons, applicants respectfully request withdrawal of the rejection.

Kazama *et al.* is directed to regulating the temperature of a susceptor of a plasma etching apparatus by controlling the susceptor's exposure to heat transfer gas. In view of amended claim 1, however, Kazama *et al.* does not disclose each and every element of the present invention.

In particular, Kazama *et al.* fails to disclose a high pressure reservoir that provides a cooling fluid to the chamber, a coupling comprising a filter and/or a controller for separately controlling inlet and outlet valves by adjusting the valves independently of the other to increase convection within the chamber without increasing the rate of flow through the chamber. Increasing convection also increases heat transfer between the cooling fluid and the substrate, which leads to an increase in uniformity of the cooling fluid temperature. Thus, the controller can effectively adjust the temperature of the incoming cooling fluid as well as regulate the outgoing flow of cooling fluid from within the chamber. By doing so, a pressure drop can be increased as well to effect more uniform cooling of the substrate.

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The Examiner relies on inlet valve 29, or alternatively, inlet valve 56 of Kazama *et al.* as anticipating the present invention as well as other various disjointed parts of Kazama's apparatus. Although Kazama *et al.* may name such features as inlet and outlet valves and a controller, it fails to teach or disclose the precise arrangement or manipulation of those features as is described in the subject cooling system to effectuate more uniform cooling of semiconductor substrates.

As is evident, Kazama *et al.* does not disclose each and every element set forth in claim 1. Thus, it does not and cannot anticipate claim 1 and/or the claims depending therefrom. In view of the foregoing, the rejection should be withdrawn.

**V. Rejection of Claims 1, 3, 4, and 7 Under 35 U.S.C. §102(b)**

Claims 1, 3, 4, and 7 stand rejected under 35 U.S.C. §102(b) as being anticipated by Krueger (U.S. Patent No. 5,131,460). Applicants respectfully request withdrawal of the rejection for at least the following reasons. As previously stated, claim 1 has been amended as noted earlier herein.

Krueger does not disclose each and every element as set forth in the subject claims. In particular, Krueger fails to teach or disclose a cooling system which includes a high pressure reservoir that provides a cooling fluid to the chamber, a coupling comprising a filter, and/or a controller for separately controlling inlet and outlet valves by adjusting the valves independently of the other to increase convection within the chamber without increasing the rate of flow through the chamber. Increasing convection also increases heat transfer between the cooling fluid and the substrate, which leads to an increase in uniformity of the cooling fluid temperature. Thus, the controller can effectively adjust the temperature of the incoming cooling fluid as well as regulate the outgoing flow of cooling fluid from within the chamber. By doing so, a pressure drop can be increased as well to effect more uniform cooling of the substrate.

The Examiner relies on valves 78 or 42 of Krueger as being equivalent to the claimed inlet valve. Valves 78 and 42 are employed to cause gas to flow from a reservoir 46 into a chamber 12. In contrast with the present invention, Krueger describes the gas as being heated or cooled as it flows through and over the surface of a heating or cooling plate 30. In the present invention, a semiconductor substrate is effectively cooled by a system that

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manipulates the flow of cooling fluid through a chamber via controlling inlet and outlet valves independently of each other. For example, incrementally closing the inlet valve apart from the outlet valve can result in an increased pressure drop across the inlet valve which facilitates the cooling process. Furthermore, the present invention, unlike Krueger, includes a filter that removes particulates from the cooling fluid as it flows through the chamber.

As can be seen, Krueger does not disclose each and every element set forth in claim 1. Hence, Krueger does not anticipate claim 1. In view of the foregoing, the rejection should be withdrawn.

**VI. Rejection of Claims 1, 3, and 4 Under 35 U.S.C. §102(b)**

Claims 1, 3, and 4 stand rejected under 35 U.S.C. §102(b) as being anticipated by Sikes (U.S. Patent No. 5,709,262). Applicants respectfully request withdrawal of the rejection for at least the following reasons. Once again, claim 1 has been amended in a manner as noted above.

Sikes also fails to disclose each and every element as set forth in the subject claims. In particular, Sikes fails to disclose a cooling system comprising, among other features, a high pressure reservoir that provides a cooling fluid to the chamber, a coupling comprising a filter, and/or a controller for separately controlling inlet and outlet valves by adjusting the valves independently of the other to increase convection within the chamber without increasing the rate of flow through the chamber. Increasing convection also increases heat transfer between the cooling fluid and the substrate, which leads to an increase in uniformity of the cooling fluid temperature. Thus, the controller can effectively adjust the temperature of the incoming cooling fluid as well as regulate the outgoing flow of cooling fluid from within the chamber. The independent regulation of the valves also facilitates increasing a pressure drop across the inlet valve which results in more uniform cooling of the substrate.

In direct contrast with the present invention, Sikes describes an electrically activated valve 38 employed to allow coolant in a first conduit 34 to flow through the valve and into energy source 16. Moreover, Sikes does not anticipate the present invention with respect to claims 1, 3 and 4, and the rejection should be withdrawn.

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**VII. Conclusion**

The present application is believed to be condition for allowance in view of the amendments and comments herein. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

The Examiner is invited to contact applicants' undersigned representative over the telephone to expedite favorable prosecution of the subject application.

Respectfully submitted,  
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